

CLAIMS

What is claimed is:

1. An article handling system comprising:  
a flow path along which articles travel; and  
a metal detection system having a metal detector to detect a metal item along the flow path, the metal detector having a metal detector test system to support a metal test piece, located relative to the flow path to move the test piece along the flow path past the metal detector in order to detect a sensitivity of the metal detector.
2. A system according to claim 1, wherein the metal detector test system comprises:  
a fluid operated cylinder coupled to a probe to support the test piece; and  
a control system to control a supply of a fluid to the cylinder to force the probe to move the test piece along the flow path.
3. A system according to claim 1, wherein the metal detector test system comprises:  
a linkage assembly comprising a plurality of links, pivoted together in a concertina arrangement, the test piece being supported on one of the links; and  
a control system to extend the linkage assembly to move the test piece along the flow path.
4. A system according to claim 1, wherein the flow path extends in a substantially vertical direction.
5. A system according to claim 4, wherein the metal detector test system comprises:  
an elongate flexible line carrying the test piece, wherein the elongate flexible line is lowered along the flow path; and  
a control system to control a lowering of payout of the line.
6. A system according to claim 1, wherein the metal detector test system moves the test piece to a retracted position wherein the test piece does not interfere with the articles flowing along the flow path.

7. A system according to claim 6, wherein the retracted position is located upstream of a point of entry of the articles into the flow path.

8. A system according to claim 1, wherein parts of the metal detector test system which are in the vicinity of the metal detection system are non-magnetic.

9. A system according to claim 1, wherein the metal detector comprises a coil surrounding the flow path.

10. A system according to claim 1, further comprising a processing system, to monitor a result of moving the test piece past the metal detector and to adjust the sensitivity of the metal detection system.

11. A system according to claim 1, further comprising:  
a combinational weighing apparatus including a plurality of article weighers, and  
a controller to pass articles in a selected combination of the weighers to be passed to the flow path when the combination satisfies a predetermined condition.

12. A method to monitor a performance of a metal detection system to detect a passage of metal items along a flow path of an article handling system, the method comprising:  
controllably moving a metal test piece along the flow path; and  
determining whether the metal detection system detects the metal test piece.

13. A method according to claim 12, further comprising stopping the article handling system if the metal detection system does not detect the test piece.

14. A method according to claim 12, further comprising stopping the article handling system if the detection system detects the test piece.

15. A method according to claim 12, wherein the metal test piece is moved along the flow path during normal operation of the article handling system.

16. A method according to claim 12, wherein the metal detection system has a metal detector to detect the metal items along the flow path, the metal detector having a metal detector test system to support a metal test piece, located relative to the flow path to move the test piece along the flow path past the metal detector in order to detect a sensitivity

of the metal detector.

17. An article handling system to move articles along a flow path, comprising:  
a detection system comprising a detector, the detection system moving a test piece  
along the flow path in order to detect a sensitivity of the detector.

18. A system according to claim 17, wherein the detector is a metal detector and  
the  
test piece is a metal test piece.

19. A system according to claim 17, wherein the detection system comprises a  
probe  
to support the test piece.

20. A system according to claim 19, wherein the detection system moves the test  
piece along the flow path by moving the probe between an extended and a retracted  
position.

21. A system according to claim 17, wherein the detection system comprises a  
linkage assembly to support the test piece.

22. A system according to claim 17, wherein the detection system comprises a  
flexible line to support the test piece.

23. A system according to claim 17, wherein the test piece remains supported by  
the  
detection system after detecting the sensitivity of the detector.

24. A system according to claim 17, wherein the test piece is moved along the  
flow  
path during a normal operation of the system.

25. A method to detect a sensitivity of a detector of an article handling system,  
comprising:  
moving a test piece along a flow path of the article handling system from a first  
position to a second position;  
determining whether the test piece is detected; and

moving the test piece to the first position.

26. A method according to claim 25, wherein the system positively moves the test piece from the first position to the second position.

27. A method according to claim 26, wherein the system positively moves the test piece from the second position to the first position.

28. The method of claim 27, further comprising stopping the system if the test piece is detected.

29. The method of claim 28, further comprising resetting the sensitivity of the detector  
if the test piece is not detected.

30. An apparatus to move articles along a flow path, comprising a detector to detect  
a test piece, wherein it is not necessary to stop the apparatus after detecting the test piece in order to recover the test piece.

31. An apparatus to move articles along a flow path, comprising a detector to detect  
a test piece, wherein the test piece is moved along the flow path during a normal operation of the apparatus.

32. An apparatus according to claim 17, wherein the test piece is positively moved along the flow path by the detection system.

33. An apparatus comprising:  
a combinational weigher weighing articles; and  
a detection system comprising a detector, the detection system moving a test piece along a flow path of the articles through the weigher in order to detect a sensitivity of the detector.

34. A system according to claim 33, wherein the detector is a metal detector and the  
test piece is a metal test piece.

35. A system according to claim 34, wherein the detection system comprises a probe  
to support the test piece.

36. A system according to claim 35, wherein the detection system moves the test piece along the flow path by moving the probe between an extended and a retracted position.

37. A system according to claim 33, wherein the detection system comprises a linkage assembly to support the test piece.

38. A system according to claim 33, wherein the detection system comprises a flexible line to support the test piece.

39. An apparatus comprising:  
means for weighing articles and for selecting a combination of the weighed articles which satisfies a predetermined weight condition; and  
a detection system comprising a detector, the detection system moving a test piece along a flow path of the articles through said means for weighing articles in order to detect a sensitivity of the detector.

40. A system according to claim 39, wherein the detector is a metal detector and the test piece is a metal test piece.

41. A system according to claim 39, wherein the detection system comprises a probe to support the test piece.

42. A system according to claim 40, wherein the detection system moves the test piece along the flow path by moving the probe between an extended and a retracted position.

43. A system according to claim 39, wherein the detection system comprises a linkage assembly to support the test piece.

44. A system according to claim 39, wherein the detection system comprises a flexible line to support the test piece.

45. An apparatus comprising:  
a combinational weigher including  
weighing units, each weighing unit weighing articles contained therein, and  
a selector selecting a combination of the weighing units less than the total number of weighing units which together contain weighed articles that satisfy a predetermined weight condition, the weighing units of the selected combination being controlled to dispense the weighed articles contained therein while the remaining weighing units hold weighed articles contained by said remaining weighing units, the dispensed articles traveling along a flow path through the combinational weigher to be output from the combinational weigher; and  
a detection system comprising a detector, the detection system moving a test piece along the flow path in order to detect a sensitivity of the detector.

46. A system according to claim 45, wherein the detector is a metal detector and the test piece is a metal test piece.

47. A system according to claim 45, wherein the detection system comprises a probe to support the test piece.

48. A system according to claim 47 wherein the detection system moves the test piece along the flow path by moving the probe between an extended and a retracted position.

49. A system according to claim 45, wherein the detection system comprises a linkage assembly to support the test piece.

50. A system according to claim 45, wherein the detection system comprises a flexible line to support the test piece.

51. The system of claim 33, further comprising a divider to separate the test piece from the articles.

52. The system of claim 33, further comprising:

a packaging machine to package the articles in bags; and  
a detector to detect a size of the bags.

53. The system of claim 36, wherein the probe is moved to the extended position at a falling speed of the articles.

54. The system of claim 36, wherein the probe is extended at a predetermined time after receiving a discharge signal, thereby extending the probe between a passage of successive articles.

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